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A NEW MODEL OF A SMALL OPHTHALMOSCOPE.

By WALTER L. PYLE, M.D.

Assistant Surgeon to Wills Eye Hospital, Philadelphia.

THIS instrument consists of two superimposed lens-discs, 34 mm. and 37 mm. in diameter respectively, each containing 14 apertures for lenses. Each disc has independent movement. The inner disc, that is, the one nearest to the



observer's eye, contains the high-power lenses, both convex and concave. Its circumference is milled and it is rotated directly by the finger, as in the Loring instrument. The outer disc, that is, the one nearest to the mirror, contains the low-power lenses, both convex and concave. A toothed edge is cut on its circumference, and it is rotated by a lower

driving wheel, 17 mm. in diameter. The two discs are enclosed in a metal case with a detachable handle. The lenses are 6 mm. in diameter. They are stopped by a spring which clicks as each lens is wheeled into place.

No claim is made for originality in construction other than the arrangement of lenses, apertures, and registration-marks, to which, however, the special advantages of the instrument are due.

The purposes in view in construction of this ophthalmoscope were to obtain :

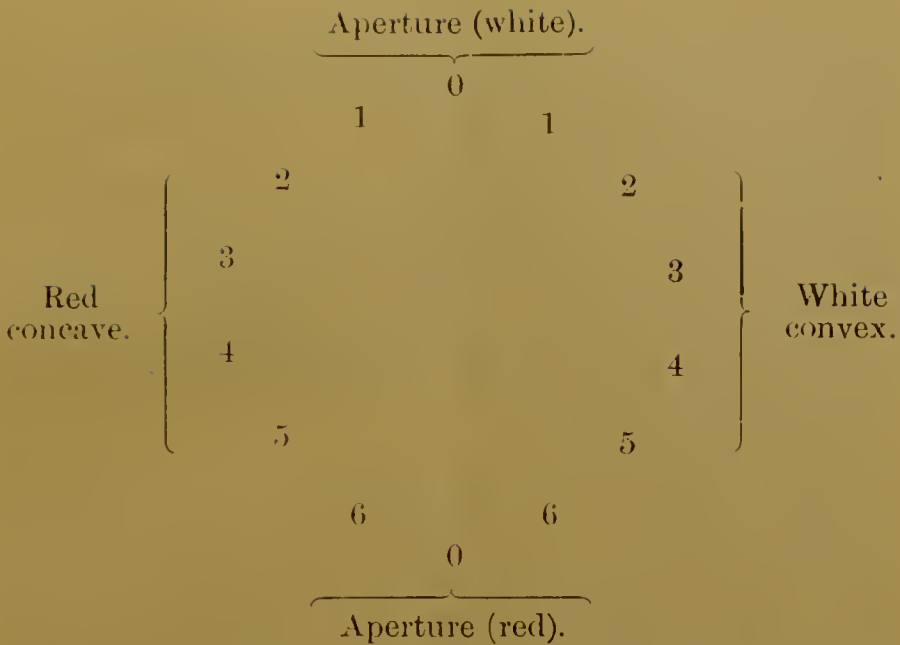
1. Neatness, compactness and durability.
2. Avoidance of direct rotation of the disc containing the low-power lenses by the finger close to the patient's nose and cheek, as in the Loring instrument.
3. Continuous movement and successive increase of both convex and concave lenses up to 24 D. without removal from the first position before the eye.
4. Avoidance of combinations of lenses.
5. Continuous registration and single registering aperture in the case.
6. An unperforated rotary mirror, small aperture, with absolute exclusion of direct or reflected light in the space between the observer's eye and the sight-hole of the mirror.
7. Simplicity and cheapness.

The following descriptions explain the construction of the instrument in pursuance of the purposes in view :

1. The dimensions of the instrument are $1\frac{1}{2}$ in. wide by $2\frac{1}{4}$ in. long. There is no serviceable instrument of smaller size made. It can be easily carried in the vest-pocket. The exact size and shape are shown in the accompanying illustration. There are no points of special wear and tear or of fine adjustment to get out of order. The case and all the frame-work are made of metal.

2. The outer disc, that is the one nearest the mirror, contains both convex and concave lenses of the following strengths : 1 D., 2 D., 3 D., 4 D., 5 D., and 6 D. These are the lenses most commonly used, and this disc is rotated indirectly by a lower small driving-wheel well out of the way of the patient's face.

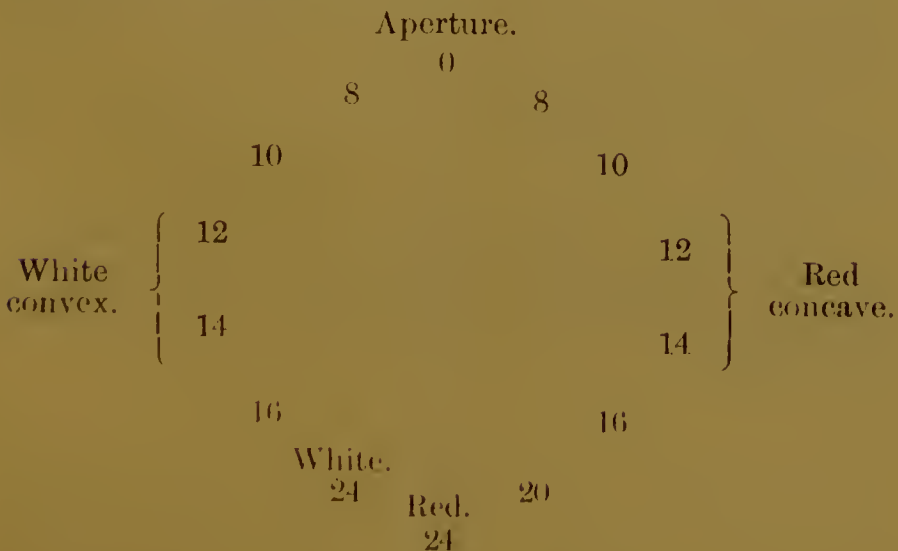
3. The lenses in this outer disc are arranged as in the following diagram :



When the lower driving-wheel which moves this disc is turned to the right, it brings the convex lenses successively before the sight-hole. When the + 6 D. lens is in this position, another turn brings the red aperture before the eye. The observer at once notices the change in focus, and his finger is raised and the inner disc is revolved directly by its milled edge, as in the Loring instrument. The lenses on the inner disc are so arranged that the first turn to the right brings before the sight-hole a + 8 D. lens, and so on up to

24 D., without removing the instrument from its first position before the eye. Similar rotation to the left causes the concave lenses from 1 D. to 24 D. to appear successively before the sight-hole.

The inner disc of lenses, that is the one nearest to the observer's eye, is arranged thus :



The aperture of this inner disc is always rotated back to the sight-hole after use, and is kept in that position to avoid interfering with the movements of the commonly used low-power lenses on the inner disc.

4. By the foregoing arrangement of lenses on the two discs, *single* lenses, both convex and concave, varying in strength from 1 D. to 24 D., can be rotated continuously and successively before the eye. By means of combinations, which, however, interfere with correct registration and were not anticipated in the construction of the instrument, the range can be increased to 30 D.

5. The registration-marks on the outer disc are arranged similarly to the lenses, so that when it is rotated just past 6 D., either concave or convex, the red zero-mark is brought before the registration-aperture on the case of the instrument. The registration-marks on the inner disc are also arranged similarly to the lenses with the exception of the zero-mark, in the place of which is an aperture cut in the disc allowing the figures on the outer disc to show through. Thus, when the inner disc containing the high-power lenses is not in use it is set at the aperture (zero) and the markings and lenses on the outer disc are unobstructed. In this manner there is obtained continuous and successive registration through a single aperture in the outside case.

6. The mirror is unperforated, the sight-hole being scraped through the silvered back; it is 2 mm. in diameter. The mirror-support is a section of a hollow metal cylinder obliquely cut at one end, extending from the back of the mirror to the outer disc, completely shutting out all direct or reflected light. These details in construction render the fundus-reflex and retinal image so much more distinct than with the ordinary mirrors that the difference is at once noticed. My experience with such a mirror on the Morton ophthalmoscope led me to adopt it.

7. There is no intricate or expensive mechanism. The apparatus consists of two discs with 25 lenses, and a small driving-wheel.

I am indebted to Messrs. Wall and Ochs, of Philadelphia, for the skilful manner in which they have followed my plans and models in the manufacture of the present perfected instrument.